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10/575,199	06/02/2006	John V. Badding	SO03-P05	7120

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EXAMINER	
ARNADE, ELIZABETH	
ART UNIT	PAPER NUMBER
1791	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/575,199	BADDING ET AL.	
	Examiner	Art Unit	
	ELIZABETH ARNADE	1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *8/03/2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *43-73* is/are pending in the application.

4a) Of the above claim(s) *63-73* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *43-62* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *4/10/2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *4/10/2006, 5/05/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 43-73 are pending as amended on 8/3/2009, claims 1-42 having been cancelled.

Election/Restrictions

2. Applicant's election of Group I, claims 43-62, is acknowledged. Claims 63-73 withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 8/3/2009.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 46, 47 and 48 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "desired" in claim 46 is a relative term which renders the claim indefinite. The term "desired" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. What is considered a desired refractive index profile for one may be different for another, therefore it is indefinite as to what "desired" refractive index profile the glass film is to provide.

Claim 46 recites the limitation "the composition" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim 47 recites the limitation "the first glass film" and "the second glass film" in lines 5 and 6 respectively. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 43, 44, 46, 49, 50, 52, 54, 55, 58-62, rejected under 35 U.S.C. 103(a) as being unpatentable over US4557914, Modone, in view of JP-6122523, Fujiura et al., ('Fujiura' hereinafter), as referenced by "Germanium and its Inorganic compounds", Johnson.

As for claim 43, Modone teaches a method of synthesizing germanium sulphide using chemical vapor deposition, comprising: (i) providing a gas mixture containing germanium tetrachloride (GeCl4) and hydrogen sulphide (H2S); and (ii) passing the gas mixture into a reaction chamber that is operated to provide a reaction temperature for the reaction: GeCl4 + 2H2S => GeS2 + 4HCl thereby synthesizing germanium sulphide in solid form and hydrogen chloride in gaseous form as a byproduct (Fig. 1; Claim 1; Col. 3, lines 3-5).

Modone does disclose a reaction temperature range from below the melting point of germanium sulphide, GeS2, but sufficient to induce reaction of the gas mixture to produce GeS2 in solid (i.e. precipitate/crystalline) form (Col. 4, lines 3-7). The melting point of solid GeS2 is interpreted as 800 degrees Celsius as referenced by Johnson (pg. 448, see section titled 'properties of germanium (IV) sulfide'). The examiner therefore interprets Modone as disclosing an upper range limit of 800 degrees Celsius.

Modone does not expressly disclose a reaction temperature of between 450-700°C.

Fujiura teaches a closely related invention of a method of synthesizing germanium sulphide using chemical vapor deposition, comprising: (i) providing a gas mixture containing germanium tetrachloride (GeCl4) and hydrogen sulphide (H2S); and (ii) passing the gas mixture into a reaction chamber that is operated to provide a reaction temperature of 300°C for the reaction: GeCl4 + 2H2S => GeS2 + 4HCl thereby synthesizing germanium sulphide in solid (glass) form and hydrogen chloride in gaseous form as a byproduct (Fig. 1; paragraph [0027]).

It would be obvious to one of ordinary skill in the art to include the reaction temperature of Fujiura with the upper range limit of Modone to provide a germanium sulphide in solid form, be it glass or crystalline form, since both Modone and Fujiura teach synthesizing germanium sulphide in solid form by reacting the same gas mixture using the same process of chemical vapor deposition, i.e. it would be obvious that one may produce germanium sulphide in solid form through chemical vapor deposition using a gas mixture containing H2S and GeCl4 by passing the gas mixture into a reaction

chamber which provides a reaction temperature below the melting point of GeS2 but sufficient to induce reaction of the gas mixture to a solid form.

The examiner notes that a temperature of 300 degrees Celsius as taught by Fujiura must be a temperature sufficient for the reaction to proceed towards a germanium sulphide in solid form; thus the examiner interprets that the temperature range taught by the combination of Modone with Fujiura to be between 300-800 degrees Celsius. As such the instant claimed range of 450-700°C lies within the disclosed range of Modone with Fujiura.

Therefore, it would be obvious for one of ordinary skill in the art at the time the invention was made to provide a reaction temperature of 450-700°C since it has been held that in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

As for claims 44, 46, 50, and 59-61 Modone and Fujiura combine to teach the method of claim 43 as detailed above.

As for claim 59, Modone further teaches providing a second gas stream of the hydrogen sulphide (H2S) (Col. 3, lines 20-23).

As for claims 44, 46, 49, 50, and 59-61 Modone does not expressly disclose wherein the germanium sulphide is deposited as a glass film on a substrate arranged in the reaction chamber; wherein the composition of the glass film is varied during its deposition to provide a desired refractive index profile; wherein the reaction chamber is operated to provide a reaction temperature of 500°C+/- 50°C (i.e. 450-550°C) to induce

formation of the germanium sulphide in glass form through the reaction; wherein the gas mixture is formed by: providing a first gas stream of a carrier gas containing the germanium tetrachloride (GeCl4); and mixing the first and second gas streams prior to introduction into the reaction chamber; wherein the carrier gas is an inert gas; wherein the hydrogen sulphide (H2S) acts as a carrier gas for the germanium tetrachloride (GeCl4); wherein the reaction chamber is operated to provide a reaction temperature between the temperature of glass transition and the temperature of onset of crystallization of germanium sulphide to induce formation of the germanium sulphide in glass form through the reaction.

Fujiura teaches a closely related invention of a method of synthesizing germanium sulphide using chemical vapor deposition, comprising: (i) providing a gas mixture containing germanium tetrachloride (GeCl4) and hydrogen sulphide (H2S); and (ii) passing the gas mixture into a reaction chamber that is operated to provide a reaction temperature for the reaction: GeCl4 + 2H2S => GeS2 + 4HCl thereby synthesizing germanium sulphide in solid form and hydrogen chloride in gaseous form as a byproduct (Fig. 1; paragraph [0027]) wherein the germanium sulphide is deposited as a glass film on a substrate arranged in the reaction chamber (paragraph [0027]); wherein the composition of the glass film is varied during its deposition to provide a desired refractive index profile (paragraph [0015]); wherein the gas mixture is formed by: providing a first gas stream of a carrier gas containing the germanium tetrachloride (GeCl4) (Fig. 1; paragraph [0027]); and mixing the first and second gas streams prior to introduction into the reaction chamber (Fig. 1); wherein the carrier gas is an inert gas,

i.e. argon (Fig. 1); wherein the hydrogen sulphide (H2S) acts as a carrier gas for the germanium tetrachloride (GeCl4) (Fig. 1); wherein the reaction chamber is operated to provide a reaction temperature between the temperature of glass transition and the temperature of onset of crystallization of germanium sulphide to induce formation of the germanium sulphide in glass form through the reaction (paragraph [0027]).

The examiner notes that Fujiura in Fig. 1 teaches that the germanium tetrachloride and hydrogen sulphide gases are mixed in a line prior to entering the reaction chamber; as such, the examiner interprets for the limitation of claim 61 that the hydrogen sulphide acts as a carrier gas for the germanium tetrachloride since the germanium tetrachloride gas is mixed with the hydrogen sulphide and is thus carried by the hydrogen sulphide along the line to the reaction chamber.

The examiner notes that is inherent in Fujiura's teachings that the reaction chamber is operated to provide a reaction temperature between the temperature of glass transition and the temperature of onset of crystallization of germanium sulphide to induce formation of the germanium sulphide in glass form through the reaction since Fujiura expressly discloses that the reaction produces a glass film.

As such, Fujiura teaches the manufacture of a germanium chalcogenide glass, GeS2, that is used to make low transmission loss chalcogenide optical fibers (Fujiura, Abstract; paragraphs [0001] and [0043]) while Modone teaches a method for producing a chalcogenide solid, GeS2, usable in the manufacture of glass containing the same, i.e. chalcogenide glass, from which optical fibers may be produced (Modone, Col. 1, lines 7-11; Col. 2, lines 24-34).

Thus, it would be obvious to one of ordinary skill in the art at the time the invention was made to include the teachings of Fujiura with the method of Modone to produce a high grade chalcogenide glass for the production of a low transmission loss chalcogenide fiber (Fujiura, Abstract; paragraphs [0001] and [0043]).

As for claim 49, Modone and Fujiura combine to teach the method of claim 43 as detailed above.

Neither Modone nor Fujiura expressly disclose wherein the reaction chamber is operated to provide a reaction temperature of 500°C+/- 50°C (i.e. 450-550°C) to induce formation of the germanium sulphide in glass form through the reaction.

Fujiura does teach inducing formation of the germanium sulphide in glass form through the reaction at a temperature of 300°C (paragraph [0027]) while Modone teaches the reaction temperature must be below the melting point to produce a solid form (Col. 4, lines 11-12). As such, the instant claimed range falls within the combined operating temperatures of Modone with Fujiura, 300-800°C.

It would be obvious to one of ordinary skill in the art at the time the invention was made to provide a reaction temperature of 500°C+/- 50°C since it has been held that in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

As for claim 52 and 55, Modone and Fujiura combine to teach the method of claim 43 as detailed above.

Modone further teaches wherein the germanium sulphide is deposited in crystalline form, i.e. solid precipitate, in the reaction chamber; wherein the reaction chamber is operated to provide a reaction temperature between the temperature of onset of crystallization of germanium sulphide and its melting temperature to induce formation of the germanium sulphide in crystalline form through the reaction (Col. 4, lines 11-14).

The examiner notes that it is inherent in the disclosure of Modone that the reaction chamber is operated to provide a reaction temperature between the temperature of onset of crystallization of germanium sulphide and its melting temperature to induce formation of the germanium sulphide in crystalline form since through the reaction Modone expressly discloses that the reaction produces a solid precipitate, i.e. crystalline germanium sulphide (Col. 4, lines 11-14).

As for claim 54, Modone and Fujiura combine to teach the method of claim 52 as detailed above.

Modone does not expressly disclose wherein the reaction chamber is operated to provide a reaction temperature of 650°C+/- 50°C (i.e. 600-700°C) to induce formation of the crystalline form of germanium sulphide through the reaction.

Modone does disclose wherein the reaction chamber is operated to provide a reaction temperature range from below the melting point of germanium sulphide, GeS2, but sufficient to induce reaction of the gas mixture to produce GeS2 in solid (i.e. precipitate/crystalline) form (Col. 4, lines 3-7). The melting point of solid GeS2 is

interpreted as 800°C as referenced by Johnson (pg. 448, see section titled 'properties of germanium (IV) sulfide').

For the instant claim to hold true, a temperature of 600°C must be at or above a temperature sufficient to induce the formation of the crystalline form of germanium sulphide through the reaction of the gas mixture; therefore, a temperature range of 600-700°C falls within the disclosed range of Modone.

Therefore, it would be obvious for one of ordinary skill in the art at the time the invention was made to provide a reaction temperature of 600-700°C since it has been held that in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

As for claim 58, Modone teaches wherein the reaction chamber is maintained at a pressure close to atmospheric during the reaction (Col. 3, lines 1-2).

As for claim 62, Modone teaches the method of claim 43 further comprising: providing in the gas mixture one or more of the following metal chlorides: GeCl4 (Col.3, lines 3-4).

Claims 45, 47, 48, and 51 rejected under 35 U.S.C. 103(a) as being unpatentable over Modone in view of Fujiura as applied to claim 43 above, and further in view of JP-60108341, Okada et al. ('Okada' hereinafter).

Modone and Fujiura combine to teach the method of claim 43 as detailed above.

Modone does not expressly disclose wherein the germanium sulphide is deposited as a glass film on the inside of a hollow tube that is one of arranged in, or

forms part of, the reaction chamber; further comprising collapsing the reaction chamber to create an optical fiber preform in which the first glass film will form the cladding layer of the optical fiber and the second glass film will form the core; further comprising drawing the optical fiber preform into an optical fiber.

Okada teaches a closely related invention of synthesizing a metal chalcogenide using chemical vapor deposition comprising: (i) providing a gas mixture and hydrogen sulphide (H2S); and (ii) passing the gas mixture into a reaction chamber thereby synthesizing a metal chalcogenide in solid form wherein the metal chalcogenide is deposited as a glass film on the inside of a hollow tube that is one of arranged in, or forms part of, the reaction chamber; further comprising collapsing the reaction chamber to create an optical fiber preform in which the first glass film will form the cladding layer of the optical fiber and the second glass film will form the core; further comprising drawing the optical fiber preform into an optical fiber; wherein the reaction chamber is a horizontal tube furnace (Abstract; Fig. 1).

The examiner interprets the inner wall of the glass tube to be the first glass film which forms the cladding layer and the chalcogenide glass film to be the second glass film which forms the core.

As such, Okada teaches the manufacture of a metal chalcogenide optical fiber preform that is further spun to make chalcogenide optical fibers of uniform composition (Okada, Abstract) while Modone teaches a method for producing a metal chalcogenide solid usable in the manufacture of glass containing the same, i.e. metal chalcogenide

glass/chalcogenide optical fiber preform, from which optical fibers may be produced (Modone, Col. 1, lines 7-11; Col. 2, lines 24-34).

It would be obvious to one of ordinary skill in the art at the time the invention was made to include the teachings of Okada with the method of Modone to produce a metal chalcogenide glass fiber preform for the production of a chalcogenide optical fiber of uniform composition (Okada, Abstract).

Claim 53 rejected under 35 U.S.C. 103(a) as being unpatentable over Modone in view of Fujiura as applied to claim 52 above in view of US3214241, Forber et al., ('Forber' hereinafter).

Modone and Fujiura combine to teach the method of claim 52 as detailed above.

Modone does not expressly disclose sealing the reaction chamber containing the germanium sulphide in crystalline form; and heating the sealed reaction chamber to melt the crystalline form of the germanium sulphide and resolidify it into glass.

Forber teaches a related invention of a method of producing germanium sulphide in solid form. Forber teaches sealing a reaction chamber, crucible with lid, containing glass forming components, germanium sulphide in crystalline form, and heating the sealed reaction chamber to melt the crystalline form of the germanium sulphide and resolidify it into glass (Col. 1, lines 66-68; Col. 2, lines 51-53 and 63-72).

It would be obvious to one of ordinary skill in the art at the time the invention was made to include the sealing and heating steps of Forber with the method of Modone. The motivation is the rationale of Forber in that these steps/techniques are well known in the manufacture an optical glass and may be applied to make a glass of a desired

composition, i.e. germanium sulphide containing, capable of transmitting a substantial portion of electromagnetic radiation (Col. 1, lines 37-41; Col. 2, lines 51-57).

Claim 56 rejected under 35 U.S.C. 103(a) as being unpatentable over Modone in view of Fujiura as applied to claim 52 above in view of US6355587, Loxley et al. ('Loxley' hereinafter).

Modone and Fujiura combine to teach the method of claim 52 as detailed above.

Modone does not expressly disclose wherein the reaction chamber is a vertical tube furnace.

Loxley teaches a vertical tube furnace as a reaction chamber which may be used for a chemical vapor deposition process (Col. 14, lines 7-14).

Absent of criticality or unexpected results, it would be obvious to one of ordinary skill in the art at the time the invention was made to include the vertical tube furnace of Loxley with the method of Modone since Modone teaches a chemical vapor deposition process and vertical tube furnaces are known in the art for carrying out a chemical vapor deposition process.

Claim 57 rejected under 35 U.S.C. 103(a) as being unpatentable over Modone in view of Fujiura as applied to claim 43 above in view of US4402720, Edahiro et al., ('Edahiro' hereinafter)

Modone and Fujiura combine to teach the method of claim 43.

Modone does not expressly disclose wherein the gas mixture is directed through a nozzle to create a reactable spray in the reaction chamber, thereby to form molten droplets which then freeze to form spheres or micro spheres of germanium sulphide.

Edahiro teaches a related invention of preparing a glass preform for production of an optical fiber using a chemical vapor deposition process wherein a gas mixture is passed into a reaction chamber wherein the gas mixture may be directed through a nozzle (Fig. 3a, 3b) to create a reactable spray in the reaction chamber (22), thereby to form molten droplets (molten soot/fine particles) which then freeze to form sphere or microspheres (vitreous glass) (Col. 3, lines 50-53; Fig. 2; Col. 6, lines 20-30).

As such, Edahiro teaches a chemical vapor deposition method of incorporating particles formed by the reaction of gases in a reaction chamber into a glass article/optical fiber preform while Modone teaches a chemical vapor deposition method wherein particles are formed by the reaction of gases in a reaction chamber which may be incorporated into a glass article/optical fiber preform (Modone, Col. 2, lines 26-32).

Absent unexpected results or criticality, it would be obvious to one of ordinary skill in the art at the time the invention was made to incorporate a known chemical vapor deposition method with the method of Modone to produce a glass article to be used for the manufacture of optical fibers.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. JP-60108337, Sato et al., teaches a method of synthesizing a chalcogenide film using chemical vapor deposition wherein an organometallic compound and H2S vapors are fed into a glass tube and the chalcogenide film is deposited on the inside of the glass tube and wherein the glass tube is further

collapsed. "Removal of OH impurities from GeS2 by reactive atmosphere and its glass preparation", Kale et al., teaches a method of synthesizing GeS2 glass by first purifying germanium sulfide powder wherein the reaction GeCl4 + 2H2S => GeS2 + 4HCl is carried out to produce germanium sulphide in solid form and hydrogen chloride in gaseous form as a byproduct.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ELIZABETH ARNADE whose telephone number is (571)270-7664. The examiner can normally be reached on M-F, 9-5 p.m., except alternate F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on 571-272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/E. A./ /Jason L Lazorcik/

Examiner, Art Unit 1791

Primary Examiner, Art Unit 1791